METRIC

KSC-SPEC-E-0018B
January 7, 1997
Supersedes
KSC-SPEC-E-0018A
September 27, 1977

AC POWER WIRE, GENERAL PURPOSE, SINGLE CONDUCTOR, 600 VOLT, 60 HERTZ, PROCUREMENT OF, SPECIFICATION FOR

INSTALLATION OPERATIONS DIRECTORATE

National Aeronautics and
Space Administration

John F. Kennedy Space Center

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APPROVED BY:

Marvin L. Jones
Director of Installation Operations

JOHN F. KENNEDY SPACE CENTER, NASA

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1. SCOPE

This specification provides data for the procurement of single conductor, 600-volt, alternating current (ac), 60-hertz power wire. The wires included in this specification employ soft annealed copper conductors, either coated or uncoated, insulated with rubber, thermoplastic, silicone, or polytetrafluoroethylene (Teflon).

1.1 Classification. - Wire included in this specification shall be of the types listed in table 1. A specification sheet for each type listed below is included in appendix A.

Table 1. Wire Types

Type	Description	Maximum Temperature Degree Celsius (°C)
TW	Moisture resistant thermo-plastic	60
THW	Moisture- and heat-resistant thermoplastic	75
THHN/THWN	Moisture- and heat-resistant thermoplastic	90 dry/75 wet
RHW	Moisture- and heat-resistant rubber	75
USE	Moisture- and heat-resistant rubber	75
RHH	Heat-resistant rubber	90
SA	Heat-resistant silicone rubber	125
TFE	Extruded polytetrafluoroethyl-ene (Teflon)	250
XHHW	Moisture- and heat-resistant cross-linked synthetic polymer (polyethylene)	90 dry/75 wet

2. APPLICABLE DOCUMENTS

The following documents form a part of this document to the extent specified herein. When this document is used for procurement, including solicitations, or is added to an existing contract, the specific revision levels, ammendments, and ap-

proval dates of said documents shall be specified in an attachment to the Solicitation/Statement of Work/Contract.

2.1 Non-Governmental.

American Society for Testing and Materials (ASTM)

ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes

(Applications for copies should be addressed to American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

National Electrical Manufacturers Association (NEMA)

NEMA WC7/ICEA S-66-524	Cross-Linked Polyethylene Insulated Wire and Cable for Transmission and Distribution of Electrical Energy

(Applications for copies should be addressed to National Electrical Manufacturers Association, 1300 N. 17th Street, Suite 1847, Rosslyn, VA 22209.)

National Fire Protection Association

NFPA 70	National Electrical Code

(Applications for copies should be directed to the National Fire Protection Association, One Batterymarch Park, Quincy, MA 02269.)

Underwriters Laboratory Inc. (UL)

UL-44	UL Standard for Safety Rubber-Insulated Wires and Cables

UL-83	UL Standard for Safety Thermoplastic-Insulated Wires and Cables
UL-854	UL Standard for Safety Service-Entrance Cables

(Applications for copies should be addressed to Underwriter's Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.)

3. REQUIREMENTS

3.1 Material.

3.1.1 Conductors. - All conductors used in wires listed in this specification shall be of soft annealed copper conforming to ASTM B3, either coated conforming to ASTM B33 or uncoated as detailed in the individual specification sheets in appendix A.

3.1.1.1 Stranding. - Conductors in gauges up to and including No. 10 American wire gauge (AWG) shall be solid. Conductors No. 8 AWG and larger shall be stranded. Stranded conductors shall be class B conforming to ASTM B8.

3.1.2 Insulation. - The various insulations used on wires in this specification shall be as specified in appendix A.

3.1.2.1 Working Voltage. - The working voltage of the completed wire shall be 600 volts, 60 hertz.

3.1.2.2 Covering. - Those wires requiring additional protection over the insulating material are identified in appendix A.

3.2 Color Coding.

3.2.1 Colors. - Single conductor wires listed in this specification shall be identified by one of the following colors: orange, brown, yellow, black, gray, white, red, blue, or green.

3.2.2 Selection. - The color of the wire shall be as specified by the procuring organization and shall conform to the colors given in 3.2.1.

3.3 Surface Marking.

3.3.1 Printing. - Wires listed in this specification shall be marked in accordance with the provisions in NFPA 70.

4. QUALITY ASSURANCE PROVISIONS

The supplier is responsible for the performance of all inspection and test requirements. Unless otherwise specified, sampling, inspection, and tests shall be in accordance with the specifications for insulation, conductor, and covering referenced in appendix A. The National Electrical Code or Underwriters Laboratories Inc. stamp or label shall be proof of sufficient factory and/or laboratory tests.

5. PREPARATION FOR DELIVERY

5.1 Packaging. - Cable and wire shall be packaged in accordance with the manufacturer's standard practice, providing that it ensures protection for the product during shipment and safe delivery to its destination.

6. NOTES

6.1 Intended Use. - This specification is intended to be used for the procurement of general-purpose single conductor 600-volt, 60-hertz, ac power wire for use in facilities, systems, and equipment at the John F. Kennedy Space Center, NASA.

6.2 Ordering Data. - Procurement documents shall specify the following information:

a. Title, number, and date of this specification and the appendix A wire specification sheet

b. Length of wire required and number of lengths

c. Color of wire

d. Wire size

NOTICE. The Government drawings, specifications, and/or data are prepared for the official use by, or on the behalf of, the United States Government. The Government neither warrants these Government drawings, specifications, or other data, nor assumes any responsibility or obligation, for their use for purposes other than the Government project for which they were prepared and/or provided by the Government, or an activity directly related thereto. The fact that the Government

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Custodian:

NASA John F. Kennedy Space Center

Preparing Activity:

John F. Kennedy Space Center
Electrical Engineering Division
Engineering Development Directorate

APPENDIX A

SPECIFICATION SHEETS FOR ELECTRICAL WIRE

SPECIFICATION SHEET FOR ELECTRICAL WIRE, TYPE TW

This specification sheet provides specific requirements for electrical wire, type TW, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0018B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Moisture-resistant thermoplastic, UL 83

Installation: Conduit, duct, raceway

Operating Temperature: 60 °C maximum

Use: General purpose

Conductor: Copper, uncoated

SPECIFICATION SHEET FOR ELECTRICAL WIRE, TYPE THW

This specification sheet provides specific requirements for electrical wire, type THW, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0018B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Moisture- and heat-resistant thermoplastic, UL 83

Installation: Conduit, duct, raceway

Operating Temperature: 75 °C maximum

Use: General purpose

Conductor: Copper, uncoated

SPECIFICATION SHEET FOR ELECTRICAL WIRE, TYPE THHN-THWN

This specification sheet provides specific requirements for electrical wire, type THHN-THWN, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0018B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Moisture- and heat-resistant thermoplastic, UL 83

Installation: Conduit, duct, raceway

Operating Temperature: 75 °C dry or wet locations and 90 °C dry locations only

Use: General purpose

Conductor: Copper, uncoated

Covering: Polyamide (nylon) jacket

SPECIFICATION SHEET FOR ELECTRICAL WIRE, TYPE RHW

This specification sheet provides specific requirements for electrical wire, type RHW, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0018B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Moisture- and heat-resistant rubber, UL 44

Installation: Conduit, duct, raceway

Operating Temperature: 75 °C maximum

Use: General purpose

Conductor: Copper, coated

SPECIFICATION SHEET FOR ELECTRICAL WIRE, TYPE USE

This specification sheet provides specific requirements for electrical wire, type USE, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0018B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation (individual conductors): Moisture- and heat-resistant rubber (RHW), UL 44 and UL 854

Installation: Conduit, duct, raceway, direct burial, aerial

Operating Temperature: 75 °C maximum

Use: General purpose underground service

Conductor: Copper, coated

SPECIFICATION SHEET FOR ELECTRICAL WIRE, TYPE RHH

This specification sheet provides specific requirements for electrical wire, type RHH, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0018B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Heat-resistant rubber, UL 44

Operating Temperature: 90 °C maximum in dry locations

Use: General purpose

Conductor: Copper, coated

SPECIFICATION SHEET FOR ELECTRICAL WIRE, TYPE SA

This specification sheet provides specific requirements for electrical wire, type SA, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0018B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Silicone rubber, UL 44

Installation: Conduit, duct, raceway

Operating Temperature: 125 °C maximum

Use: Special application - high-temperature location

Conductor: Copper, uncoated

Covering: Glass or other suitable braid (asbestos shall not be used)

SPECIFICATION SHEET FOR ELECTRICAL WIRE, TYPE TFE

This specification sheet provides specific requirements for electrical wire, type TFE, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0018B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Heat-resistant polytetrafluoroethylene (Teflon), UL 83

Installation: Conduit, duct, raceway

Operating Temperature: 250 °C maximum

Use: Special application - high temperature

Conductor: Copper, coated

SPECIFICATION SHEET FOR ELECTRICAL WIRE, TYPE XHHW

This specification sheet provides specific requirements for electrical wire, type XHHW, 600 volt, 60 hertz, ac; forms a part of John F. Kennedy Space Center Specification KSC-SPEC-E-0018B; and is mandatory for use by KSC and associated contractors.

General Description

Insulation: Flame retardant, cross-linked synthetic polymer (polyethylene), UL 44

Installation: Conduit, duct, raceway

Operating Temperature: 90 °C maximum in dry locations and 75 °C maximum in dry or wet locations

Use: Good resistance to chemicals, fumes, and gases

Conductor: Copper, uncoated

Covering: PVC (polyvinylchloride) jacket NEMA WC-7/ICEA 66-524